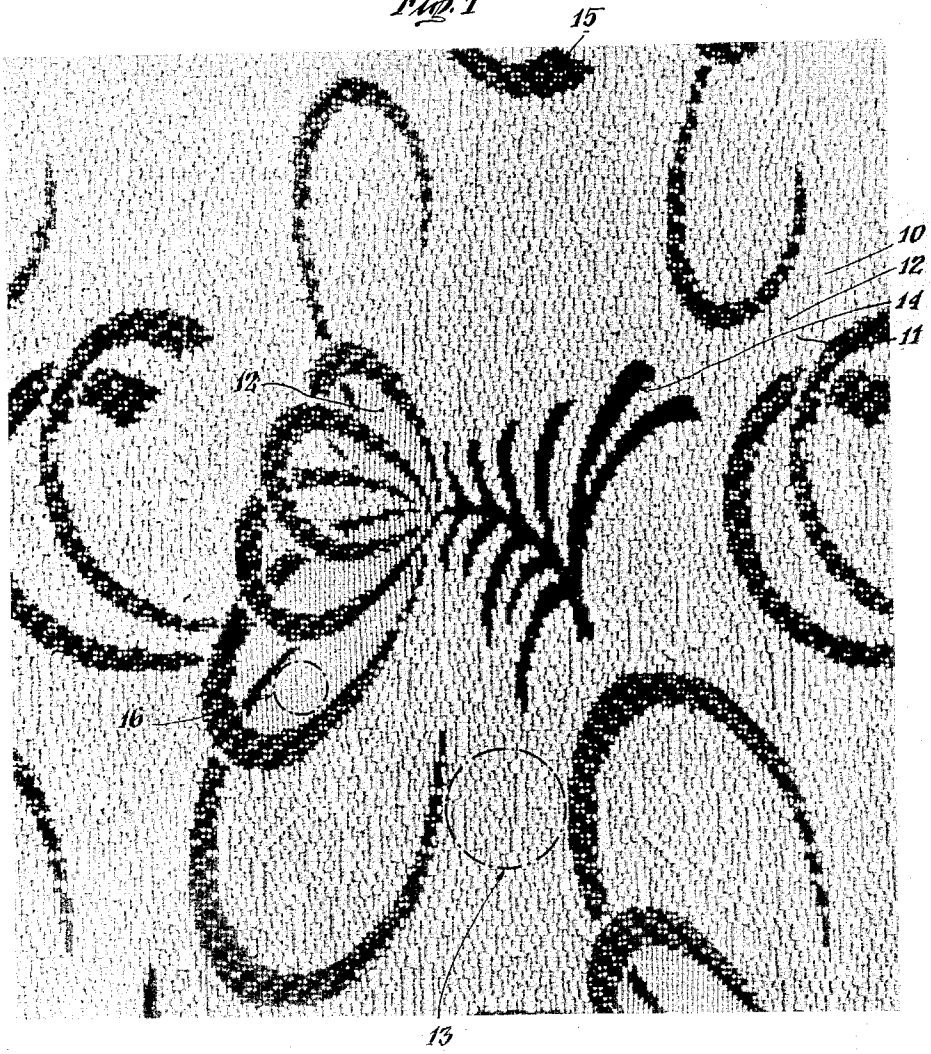
June 15, 1954 E. J. DACEY 2,681,083

PILE FABRIC

Filed Nov. 29, 1949 2 Sheets-Sheet 1

Fig. 1



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Fig. 2

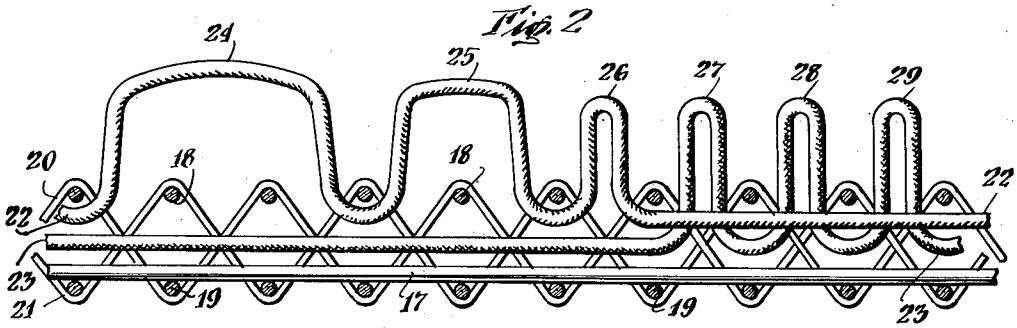


Fig. 3

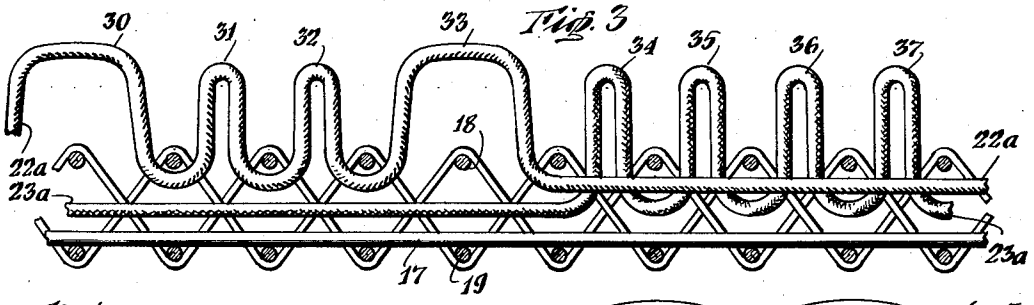


Fig. 4

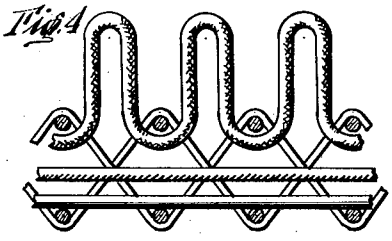


Fig. 5

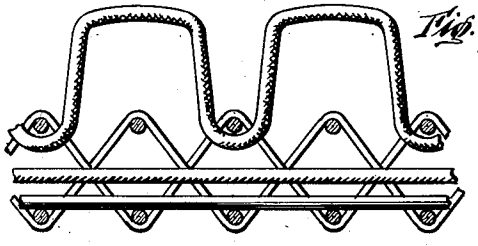


Fig. 6

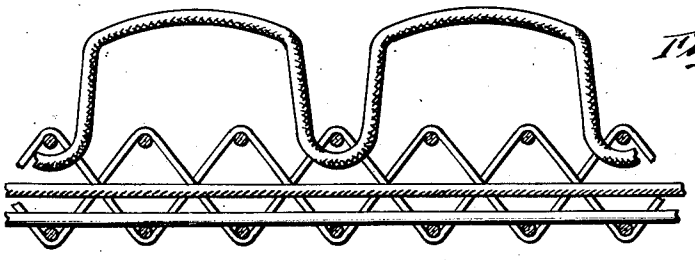
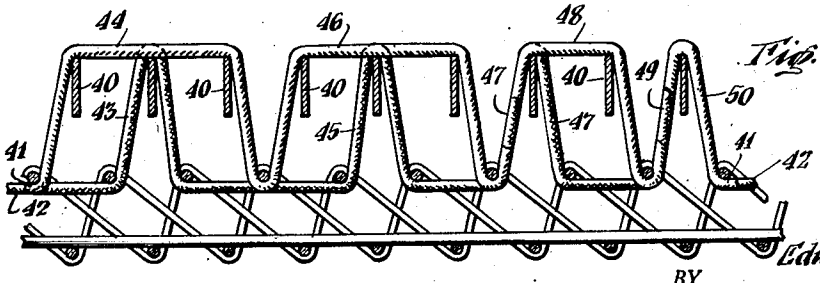


Fig. 7



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UNITED STATES PATENT OFFICE

2,681,083

PILE FABRIC

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Application November 29, 1949, Serial No. 129,975

4 Claims. (Cl. 139—406)

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This invention relates to a new pile fabric of the Wilton weave type, and more particularly to a pile fabric having a pile surface containing pile loops of different contents of yarn. The pile loops may be so located in a single or in different fabrics as to provide various desired artistic effects for a pile surface of a floor covering. The pile loops of different contents are produced by selectively raising pile warps over different numbers of wires, and the number of wires over which a pile warp remains raised during one, two, three or more weaving operations determines the yarn content of each pile loop.

Pile loops having different contents may be intermingled within a given area of pile surface, and, if desired, contrasting areas of pile loop may be formed with one area having pile loops of different contents and another area having pile loops of a common content, and these different arrangements can be modified by employing warp yarns having different characteristics. The pile loops may be selectively cut or uncut or wholly cut or uncut, as desired. In order to simplify the description, but without limitation, the pile will be described as a looped pile.

The invention concerns pile fabrics wherein decorative effects are obtained by the structure of the pile loops. The surface coverage provided by the pile loops is coextensive with the area of the fabric, in contradistinction to decorative effects sometimes obtained by selectively omitting pile to create designs effected with voids in the pile surface. Design effects in the pile fabric of the present invention are obtainable by forming pile loops of different contents, as desired, in sucessive rows, or in successive groups of rows, running weftwise of the fabric, and also by staggering portions of the weftwise rows of pile loops of the same or of different contents warpwise of the fabric. Additional design effects may be obtained by variously forming the pile loops in contrasting areas, one of which has pile loops of different contents, and another of which has pile loops of uniform content.

The pile loops of different contents are produced by selectively raising the pile warps over different numbers of wires of the same height. The selective raising of the pile warps is attainable by the use of a jacquard mechanism by which the raising and lowering of the harnesses are controlled to cause selected pile warps to be held in a raised position for one or more cycles of the loom during the placing of one or more wires so as to produce pile loops in the surface

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of the fabric which extend over one or more wires, as determined by a series of perforated cards. The pile loops thereby produced in warpwise rows may therefore be of one content, if each is formed over a single wire, or of a greater content depending upon whether they are formed over two, three or more wires. The same controlling mechanism effects control of the pile warps by selectively floating them in the body of the fabric during one or more cycles of the operation of the loom and one of two or more pile warps contained in a single dent may be floated for one or more cycles of the loom, while their companion pile warps in the same dent are selectively raised for one or more cycles of the loom, whereby different designs attributable to the structure of the pile loops and their locations may be produced. Other effects may be produced by selectively raising one or another pile warp of different physical characteristics (e. g., types of yarn, color, and sizes of yarns), depending upon which of several of the distinguishing pile warps is raised or not.

In addition to providing a pile fabric of the Wilton weave type, having pile loops of different content and of utilizing the arrangement of such pile loops in a manner to produce pleasing effects, the invention is featured by enabling the production of a pile fabric wherein the pile loops provide complete coverage of the surface of the fabric without utilizing such quantity of yarn in the pile warps as would be required to obtain complete surface coverage for a weave having pile loops of uniform height and yarn content. In addition to the economies effected by the manner in which the pile yarn is utilized, there results savings in manufacturing costs.

The application of the invention may be readily understood by reference to the drawings in which

Fig. 1 is a view of an example of a pile surface of a fabric which has been chosen to illustrate the principles of the present invention;

Fig. 2 is a diagrammatic view illustrating a warpwise section having two pile warps in a single course;

Fig. 3 is a diagrammatic view illustrating two pile warps in a course adjacent to the course shown in Fig. 2;

Figs. 4, 5 and 6 diagrammatically illustrate the relationship of pile loops of different yarn contents; and

Fig. 7 illustrates how pile loops of different yarn contents are formed over one, two and three wires.

Various pile structures are illustrated in Fig. 1. The pile loop illustrated at 13 was raised over three wires; the pile loop illustrated at 11 was raised over two wires, and the pile loop illustrated at 12 was raised over one wire. The illustrated fabric contains two pile warps per course, and the particular design chosen for explanatory purposes was produced by the use of a green and a grey pile warp in each dent, but it is to be understood that one or more pile warps per dent may be employed. The light shade pile loops were formed by grey pile warps, and the dark shade pile loops were formed by green pile warps. By floating the green pile warps within the body of the fabric and raising only the grey pile warps, a one-color area is produced, such as the area 13. Contrasting areas, such as the one indicated by the reference character 14, were produced by raising only the green pile warps while at the same time causing the grey pile warps to float in the body of the fabric. A further variation in the appearance of the fabric was attained by selectively raising the grey pile warps and the green pile warps as demonstrated by the area 15.

Apart from the contrasting effect between the areas 13 and 14 owing to the use of yarns of different colors, a further contrasting effect is had from forming the areas 14, 15 and 16 solely by looping pile warps over individual wires. In producing the area 16 all of the grey pile warps were looped over individual wires, and all of the green pile warps were floated in the body of the fabric.

The contrasting effects between the areas 13 and 16 are due solely to the contents of the pile loops in the two areas. The content of a pile loop is defined as the length of pile yarn which extends above the body or carcass of the fabric and constitutes the pile loop. All of the pile loops in each of the areas 14 and 16 were raised over single wires of the same height, and therefore each pile loop in these areas has the same content of yarn.

From an inspection of the construction of the pile loops contained in the general vicinity of the area 13, as illustrated in Fig. 1, it is apparent that a variety of different designs may be produced by employing pile warps of only one color, or of only one physical characteristic, and by selectively raising the pile warps. A distinguishing feature of the invention is the capability of producing designs wherein the regularity of the weftwise rows of pile loops, or of the warpwise rows of pile loops, or of both the warpwise and the weftwise rows of pile loops is broken. This characteristic may appear in a single pile fabric and constitute the entire pile surface thereof, or may appear in a pile fabric in conjunction with regular weftwise and warpwise rows of pile loops, such as are found in any or all of the areas 14, 15 and 16.

Fig. 2 shows different pile loops in a warpwise section of a fabric employing the invention. The fabric structure includes the usual stuffer warps 17, in any number desired, upper and lower weft shots 18 and 19, respectively, and the binder warps 20 and 21, which cross above the upper weft shots and below the lower weft shots and bind the weft shots in place.

In Fig. 2 there are illustrated two pile warps 22 and 23 within a single course, but it will be understood that more pile warps per course may be employed. The pile warp 22 is grey and the pile warp 23 is green. The grey pile warp was selectively raised over three, two and one wire, respectively, with the result that the three pile loops 24, 25 and 26 differ in yarn content. The pile warp 23 is green, and since the area adjacent the pile loops 24, 25 and 26 is grey, the green pile warp 23 was floated in the body of the fabric as the grey pile loops 24, 25 and 26 were formed at the surface of the fabric. The green pile warp 23 was then successively raised over single wires to produce the green pile loops 27, 28 and 29, and as the green pile loops were formed, the grey pile yarn 22 was floated in the body of the fabric.

The arrangement of the pile loops in a course adjacent to the course illustrated in Fig. 2 is illustrated in Fig. 3. In Fig. 3, the grey pile warp 22a was successively raised over two wires, one wire, one wire and two wires, to produce the grey pile loops 30, 31, 32 and 33, respectively. The pile loops 31 and 32 are of one content, they having been individually formed over single wires, and the pile loops 30 and 33 are of a greater content than either of the pile loops 31 or 32, they having been individually formed over two wires.

It should be noted that the pile loop 33 in one course (Fig. 3) and pile loop 25 in the adjacent course (Fig. 2) were formed over the same two wires and consequently lie in a straight weftwise row of pile loops. The pile loop 24 (Fig. 2) and the pile loop 30 (Fig. 3) were formed over groups of three and two wires, respectively, with one of the wires being common to both groups of wires. By looping a number of pile yarns over a group of wires and another number of pile yarns over an adjacent group of wires, one wire of which is common to the first group of wires, weftwise rows of pile loops staggered in a warpwise direction are obtainable. This result is exemplified by the pile loop 24 of one weftwise row and the pile loop 30 of another weftwise row of pile loops.

To the right of the pile loop 33 the grey pile warp 22a was floated in the body of the fabric for a number of wires as the green pile warp 23a was successively raised over single wires to form the pile loops 34, 35, 36 and 37. The green pile loops 35, 36 and 37 in one course (Fig. 3) are adjacent the green pile loops 27, 28 and 29 in the adjacent course (Fig. 2) and therefore produce a solid color effect (e. g. green) in the pile surface of the fabric. The green pile loop 34 (Fig. 3) and the grey pile loop 26 (Fig. 2) are of the same content, each having been formed over one and the same wire, and distributed in a common field they produce a speckled effect in the pile surface. The area 15 Fig. 1, has a speckled effect which was produced in like manner.

It is apparent from the foregoing that fields similar to the area 13 in Fig. 1 and containing limitless permutations and conbinations of pile loops of different contents may be produced by selectively raising the pile warps over one or more wires, as demonstrated with reference to the forming of the pile loops 24, 25, 26 (Fig. 2), 30, 31, 32 and 33 (Fig. 3); that when a solid color pattern containing regular rows of uniform pile loops as appear in the areas 14 and 16 is desired, adjacent pile warps of appropriate color, may be raised individually over one wire, or over the same number of wires, in the manner in which the pile loops 27, 28, 29 (Fig. 2), 35, 36 and 37 (Fig. 3) were formed; and that for producing variegated fields in any portion of a pile surface, pile warps of different characteristics may be employed, such, for example, by using pile warps of contrasting colors and selectively raising the pile warps.

The variety of patterns or artistic effects attainable are pracically limitless because the pile

formation may be produced by raising selected pile warps over one or two or three or more wires regularly as the construction of the carpet progresses, or indiscriminately by variously selecting the pile warps in one or more dents and raising them over one or two or three or more wires as the construction of the carpet progresses. Also, the selection of one or more of several pile warps in a dent enables further variety in the pile effects to be produced. All or any number of the pile warps in a dent may be selected for raising over the same one or more wires.

In Figs. 4, 5 and 6, there is diagrammatically illustrated what is meant by pile loops of different yarn contents. In these figures the usual upper and lower weft shots, stuffer warps and chain warps appear. In Fig. 4 there are three pile loops each having the same content of yarn. Each of these pile loops was formed by carrying the yarn over individual wires. In Fig. 5 there are illustrated two pile loops each having a yarn content different from the individual pile loops illustrated in Fig. 4. Each of these pile loops was formed by carrying the yarn over two successively placed wires, thereby forming individual pile loops having more length of pile yarn above the body of the fabric than any of the individual pile loops illustrated in Fig. 4. In Fig. 6 the pile yarn was carried over three successively placed pile wires to form a single pile loop, and the contents of the yarn in each pile loop is greater than the contents of the yarn in any of the pile loops of Figs. 4 and 5 because the length of the pile yarn constituting one pile loop is longer than the lengths of the yarn of each pile loop of either Figs. 4 or 5.

It is pointed out that because of the utilization of pile loops of different contents in the fabric of the present invention, there is a saving of pile yarn in a fabric employing the present invention, as compared with a fabric wherein all of the pile yarn is carried over individual wires. In the latter case, a greater length of pile yarn is required to construct a given length of the carpet than is required for constructing a carpet embodying the applicant's present invention. This is because some of the yarn which is ordinarily buried in the body of the fabric in the manufacture of a Brussels carpet, or of a conventional carpet, is utilized in the carpet of the present invention in the pile loops formed over a greater number of wires. As explained hereinabove, the selection of the number of wires over which the yarn is carried in forming the pile loops is preferably accomplished in such an order or arrangement as to produce a structural design effect different from fabrics having all of the pile warps regularly raised over one or adjacent pairs of wires and form pile loops of uniform yarn content.

Another feature of the invention which is discernible from the shadows which appear in the illustration of the fabric shown in Fig. 1, and which is directly attributable to the presence of yarn of different contents in the various pile loops, is the difference in the heights of the pile loops of different yarn contents. The pile loop which is formed over the greater number of wires appears in the drawing to be and actually is taller than the pile loop which is formed over a fewer number of wires. For example, the pile loop which was formed over two or three wires is higher than the pile loop which was formed over a single wire, notwithstanding the use of wires of the same height.

In Fig. 7 there is schematically illustrated the

formation of several pile loops from two pile warps **41** and **42** contained within a single dent and with one row of the pile loops having been formed by raising the pile warp **42** over four single wires **40**, one at a time, and the other row of the pile loops having been formed by raising the pile warp **41** over several wires at a time, each of the groups of wires including a single wire over which the pile warp **42** is raised. Counting from the left, the pile warp **41** is raised over three wires and floated as a buried yarn between an upper and a lower shot of filling, then raised over three wires and floated as a buried yarn between an upper and a lower shot of filling, then raised over two wires and floated as a buried yarn between an upper and a lower shot of filling and then raised over one wire. Starting at the same cycle of operation the pile warp **42** is floated as a buried yarn between two upper and two lower shots of filling, then raised for one wire and floated between three upper and three lower shots of filling as a buried yarn, then raised over one wire and floated as a buried yarn between two upper and two lower shots of filling, then raised over one wire and floated as a buried yarn between two upper and two lower shots of filling, and then raised over one wire and floated. In this order of raising the pile yarns the pile loop **43** is located adjacent the pile loop **44** in the same dent, and this is also so with respect to the pile loops **45** and **46**, the pile loops **47** and **48**, and the pile loops **49** and **50**. Each of the pile loops **43**, **45**, **47** and **49** is formed over a wire which is included in the three, three, two and one groups of wires by which the pile loops **44**, **46**, **48** and **50** are formed, respectively.

When the wires are removed in the course of weaving, the pile loops **44**, **46** and **48** will extend to greater heights than the pile loops **43**, **45** and **47** because they have greater yarn contents. The pile loops **49** and **50** formed by the two pile yarns will have the same height when the wire is removed, owing to the fact that they are formed over the same wire. When a pile yarn of two or more pile yarns in a dent is raised over one wire of a group of wires over which another pile yarn in the same dent is raised, the pile loop formed by the single wire will tend to underlie the larger pile loop which is formed over the group of wires when the wires are removed with the result that the presence of the lower or smaller pile loop contributes to the stability or erection of the higher or larger pile loop. This is evident from a study of Fig. 7 which shows the forming of the smaller pile loop **43** which will extend upwardly to below or inside of the larger pile loop **44**.

I have chosen to illustrate the application of the invention in a Brussels type weave wherein all of the pile appear in the finished fabric as looped pile, but I wish it to be understood that certain or all of the pile loops may be cut, as may be desired. The cutting of the pile loops may be accomplished in the usual way by employing knives or spoons at the ends of the selected wires.

The utility of the invention is not limited to any particular pattern, figure, texture, or to the choice of pile yarn warps having different characteristics, because the invention is capable of numerous forms and various applications without departing from the principles herein disclosed. It is therefore intended and desired that the specific description provided be deemed illustrative and not restrictive, that the patent shall cover all patentable novelty set forth, and that reference is to be made to the following claims

rather than to the particular disclosure herein contained to indicate the scope of this invention.

What is claimed is:

1. In a Wilton-weave fabric containing pile loops initially formed over wires of the same height, the combination comprising stuffer warps, weft shots lying above and below the stuffer warps, binder warps crossing the weft shots above and below and binding the weft shots in place, a plurality of pile warps held in place by portions thereof lying between the upper and lower weft shots and having other portions in the form of pile loops, some of the pile loops in a single pile warp being bound by adjacent upper weft shots and having one height, and other of the pile loops of the same pile warp being bound by upper weft shots spaced apart by one intervening weft shot and extending above the intervening weft shot and having greater height than the pile loops bound by adjacent weft shots, and still other of the pile loops of the same pile warp being bound by upper weft shots spaced apart by two intervening weft shots and extending above the two intervening weft shots and having greater height than the pile loops bound by upper weft shots spaced apart by one upper weft shot, the pile loops of a plurality of said pile warps being arranged in the face of the fabric with laterally adjacent pile loops (of the respective pile warps) having a common height forming a definite rectilinear row of pile loops and other laterally adjacent, but warpwise-staggered, pile loops all having the same height and forming a definite curvilinear row of pile loops, said fabric having a plurality of said rectilinear and curvilinear rows of pile loops with some of said rows of pile loops constituted of pile loops of one height, other of said rows of pile loops constituted of pile loops of another height, and still other of said rows of pile loops constituted of pile loops of a third height.

2. In a Wilton-weave fabric containing pile loops initially formed over wires of the same height, the combination comprising stuffer warps, weft shots lying above and below the stuffer warps, binder warps crossing the weft shots above and below and binding the weft shots in place, and pile warps providing pile loops in the surface of the fabric, said pile warps being arranged with at least two pile warps per course, one of the pile warps in each course providing pile loops of different heights, some of which are bound by adjacent upper weft shots and having one height and others of which are bound by upper weft shots spaced apart by at least one intervening upper weft shot and having greater height than the pile bound by adjacent weft shots, and another of the pile warps in the same course likewise providing pile loops of different heights with some of the pile loops bound by adjacent upper weft shots and having one height and other of the pile loops bound by upper weft shots spaced apart by at least one intervening upper weft shot and having greater height than the pile loops bound by adjacent weft shots, and some of the pile loops in the warps in the same course being bound by the same upper weft shots and other of said pile loops being bound by a common upper weft shot and other but different upper weft shots so the respective pile warps within at least one course provide at least two laterally adjacent pile loops of the same height and at least two laterally adjacent pile loops of different heights overlapping one another warpwise of the fabric.

3. In a Wilton-weave fabric containing pile loops initially formed over wires of the same height, the combination comprising stuffer warps, weft shots lying above and below the stuffer warps, binder warps crossing the weft shots above and below and binding the weft shots in place, and a plurality of courses of two or more pile warps in each course held in place by portions thereof lying between the upper and lower weft shots and other portions in the form of pile loops of different heights, some of the pile loops in each course being formed by a single pile yarn bound by adjacent upper weft shots and other of the pile loops bound by upper weft shots which are spaced apart by at least one intervening upper weft shot and thereby providing pile loops of different heights along each course, with pile yarns in a common course containing pile loops of different heights disposed adjacent one another weftwise of the fabric and which overlap each other warpwise of the fabric due to being bound in by different pairs of weft shots.

4. In a Wilton-weave fabric containing pile loops initially formed over wires of the same height, the combination comprising stuffer warps, weft shots lying above and below the stuffer warps, binder warps crossing the weft shots above and below and binding the weft shots in place, and at least two pile warps per course, each of said pile warps within each of several courses providing pile loops of different heights and lengths including a pile loop of one height and length provided by one of said pile warps within at least one of said courses and a pile loop of greater height and greater length provided by another pile warp within the same course, said last-named pile loop of greater height and greater length being bound by weft shots back of and forward of the weft shots which bind said pile loop of one height and length so that said pile loop of greater height and greater length straddles said first-named pile loop.

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